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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/808,559

03/25/2004

Tetsunori Kaji

520.35237CV4

4764

20457

7590

02/15/2007

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EXAMINER

CROWELL, ANNA M

ART UNIT

PAPER NUMBER

1763

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/808,559

Applicant(s)

KAJI ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on November 27, 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-25 and 27-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-25 and 27-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 8-25, 27, and 28-38 are pending in the application. Claims 8-25, 27, and 28-38 are finally rejected.

Claim Objections

1a. Claim 8 is objected to because of the following informalities: In line 14 of claim 8, the term "densiry" is misspelled and should be changed to --density--. Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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3. Claims 8, 13, 16, 19, 24, 25, 29, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lenz et al. (U.S. 5,534,751) in view of Ohmi (U.S. 5,272,417) and Lenz et al. (U.S. 5,569,356).

Referring to Figures 1 and 2, column 4, line 48-column 6, line 65, Lenz et al. discloses a plasma processing apparatus comprising: a vacuum processing chamber 17 for processing a sample, by using plasma, an outer chamber 11 surrounding the vacuum processing chamber 17 connected with an evacuation means (col. 4, lines 53-54, col. 5, lines 4-5), a gas supplying unit for introducing into the vacuum processing chamber a processing gas (col. 5, lines 1-4); an upper electrode 14 and a lower electrode 13 for generating plasma therebetween and providing the vacuum processing chamber (col. 4, lines 60-63); a discharge confining means 30 separating the vacuum processing chamber 17 from the outer chamber 11 and for increasing plasma density in the vacuum processing chamber (Fig. 1, col. 6, lines 8-29).

Lenz et al. fails to teach the electrode cover is made of silicon.

Referring to column 6, lines 33-43, Ohmi teaches an electrode cover 101 made of silicon. The electrode cover 101 prevents etching of the electrode 102. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide one of the electrodes of Lenz et al. with the an electrode cover as taught by Ohmi in order to prevent etching of the electrode.

Lenz et al.'751 fails to teach the discharge confining means is made of SiC.

Referring to Figures 2 and 3, column 5, line 3-column 6, line 10, Lenz et al.'356 teaches a plasma processing apparatus which uses a discharge confining means 34 made of SiC since the material is stable in a plasma environment (col. 2, lines 25-29, col. 5, lines 13-16, 54-64).

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Additionally, the motivation for making the discharge confining means out of SiC is to provide an alternate material of construction that would limit the contamination caused by the interaction of plasma. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the discharge confining means of Lenz et al.'751 to be made of SiC as taught by Lenz et al.'356 since it is an alternate material of construction that would limit the contamination caused by the interaction of plasma.

Regarding the limitation of "fluorine-containing etching gas", the type of gas used in apparatus claims is considered intended use and therefore is of no significance in determining patentability. Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim. *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Additionally, Ohmi teaches that a fluorine containing gas is conventionally used for etching a film (col. 6, lines 29-33). Thus, the apparatus of Lenz et al. in view of Ohmi is capable of providing a fluorine containing gas to the chamber.

Regarding the limitation of "an insulator film in the sample", this is considered intended use and therefore is of no significance in determining patentability. The inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." In *re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963). Moreover, the apparatus of Lenz et al. in view of Ohmi is capable of processing various types of films (Lenz et al., col. 6, lines 3-7, Ohmi, col. 12, lines 12-15) and thus is capable of processing an insulator film on the sample.

With respect to claims 13 and 24, the apparatus of Lenz et al. further includes that the discharge confining means 30 is ring-shaped (Fig. 2, and col. 5, lines 56-59).

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With respect to claims 16 and 25, the apparatus of Lenz et al. further includes that the discharge confining means is provided with at least a gap for evacuating the processing gas from the vacuum chamber 17 to the outer chamber 12 (col. 6, lines 30-34).

With respect to claim 29, the apparatus of Lenz et al. further includes wherein the vacuum container includes an outer chamber 11, connected with an evacuation means, surrounding the vacuum processing chamber 17, and wherein the discharge confining means 30 is located to serve as means for separating the vacuum processing chamber 17 from the outer chamber 11 (Fig. 1).

With respect to claims 33 and 35, the apparatus of Lenz et al. further wherein the discharge confining means 30 is located for maintaining a uniform reaction in the vacuum processing chamber (col. 3, lines 23-38).

4. Claims 9-12, 14-15, 17-18, 20-23, 30, 34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lenz et al. (U.S. 5,534,751) in view of Ohmi (U.S. 5,272,417) and Lenz et al. (U.S. 5,569,356) as applied to claims 8, 13, 16, 19, 24, and 25 above, and further in view of Steger et al. (U.S. 5,494,523) or Ogasawara et al. (J.P. 07-135200).

The teachings of Lenz et al. in view of Ohmi and Lenz et al.'356 have been discussed above.

Lenz et al. in view of Ohmi and Lenz et al.'356 fail to teach a susceptible cover comprised and made of silicon.

Referring to column 3, lines 39-42, and column 4, line 64-column 5, line 25 of Steger et al. and the abstract of, Steger et al. or Ogasawara et al. teaches it is conventionally known in the

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art to provide a sample mounting surface with a susceptible cover comprised of silicon in order to reduce particle trapping and to improve process uniformity. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the sample mounting surface of Lenz et al. in view of Ohmi and Lenz et al.'356 with the susceptible cover comprised and made of silicon as taught by Steger et al. or Ogasawara et al. since this would reduce particle trapping and improve process uniformity.

With respect to a high frequency electric power source, Lenz et al. further includes a high frequency electric power source 24 for generating plasma between upper 14 and lower 13 electrodes (Fig. 1, col. 5, lines 11-20)

With respect to a bias electric power source, Lenz et al. further includes a bias electric power source 23 to control the energy of ions in the plasma (Fig1., col. 5, lines 16-20, 34-38).

5. Claims 27, 28, 31, 32, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lenz et al. (U.S. 5,534,751) in view of Ohmi (U.S. 5,272,417), Lenz et al. (U.S. 5,569,356), Steger et al. (U.S. 5,494,523) or Ogasawara et al. (J.P. 07-135200) as applied to claims 9-12, 14-15, 17-18, and 20-23 above, and further in view of Koshiishi et al. (U.S. 5,919,332) and Lenz et al. (U.S. 5,609,720).

The teachings of Lenz et al. in view of Ohmi, Lenz et al.'356, and (Steger et al., or Ogasawara et al.) have been discussed above.

Lenz et al. in view of Ohmi, Lenz et al.'356, and (Steger et al., or Ogasawara et al.) fail to teach a plasma density of $5 \times 10^{10} \text{ cm}^{-3}$ to $5 \times 10^{11} \text{ cm}^{-3}$ between the upper electrode and lower electrode to etch a fine pattern on the sample having a diameter of 300 mm or more.

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Referring to column 13, lines 14-17, Koshiishi et al. teach a plasma density of $5 \times 10^{10} \text{ cm}^{-3}$ to $5 \times 10^{11} \text{ cm}^{-3}$ between the upper electrode and lower electrode in order to perform fine etching with a high etching rate (col. 6, lines 10-20). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the plasma density of Lenz et al. in view of Ohmi, Lenz et al.'356, and (Steger et al., or Ogasawara et al.) to be $5 \times 10^{10} \text{ cm}^{-3}$ to $5 \times 10^{11} \text{ cm}^{-3}$ as taught by Koshiishi et al. in order to perform fine etching with a high etching rate.

Referring to column 2, lines 35-41, Lenz et al.'720 teach that it is conventionally known in the art to process a wafer having a diameter of 300 mm. Thus, it would have been obvious to scale up the apparatus including the table in Lenz et al.'751 in view of Ohmi, Lenz et al.'356, and (Steger et al., or Ogasawara et al.) in order to process a wafer having a diameter of 300 mm since it is conventionally known in the art to process wafers having a diameter of 300 mm. Additionally, according to *In Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to scale up/down the apparatus including the table of in Lenz et al.'751 in view of Ohmi, Lenz et al.'356, and (Steger et al., or Ogasawara et al.) in order to process a sample with a diameter of 300 mm or more and additionally the motivation for optimizing the size of the table is to enable the table to hold the desired size of substrate.

Response to Arguments

6. Applicant's arguments filed November 27, 2006 have been fully considered but they are not persuasive.

Applicant has argued the confinement ring in Lenz'356 only surrounds the upper electrode 10, and clearly does not serve the claimed function of increasing the plasma density in the vacuum processing chamber; however, claim 8 is rejected over Lenz et al.'751 in view of Ohmi'417 and Lenz et al.'356. In response to applicant's argument that **Lenz'356 only surrounds the upper electrode**, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In the instant case, Lenz et al.'356 was simply applied to teach that it is conventionally known in the art for a discharging confining means to be comprised of SiC. As seen in Figure 1, Lenz et al.'751 discloses a discharge confining means 30 separating the vacuum processing chamber 17 from the outer chamber 11. Additionally, due to the structure and function of the discharge confining means 30 of Lenz et al.'751, the plasma density is increased in the vacuum process chamber. Moreover, the function of the discharge confining means 30 of Lenz et al.'751 is to confine the plasma to a smaller region. Furthermore, it should be noted that density is indirectly proportional to volume ($D=M/V$). Thus, when the discharge confining means is applied to the vacuum processing chamber, it reduces the plasma volume, and hence the density is increased. In addition, one cannot show nonobviousness by attacking references individually where the

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rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, the rejection of the claim 8 over Lenz et al.'751 in view of Ohmi'417 and Lenz et al.'356 and not simply Lenz et al.'356. Thus, the rejection of Lenz et al.'751 in view of Ohmi'417 and Lenz et al.'356 satisfies the claimed requirement.

Applicant has argued that the cited prior art fails to teach or suggest this separating feature for a discharge confining ring; however, as stated above and as seen in Figure 1, Lenz et al.'751 discloses a discharge confining means 30 separating the vacuum processing chamber 17 from the outer chamber 11. Thus, the rejection of Lenz et al.'751 in view of Ohmi'417 and Lenz et al.'356 satisfies the claimed requirement.

Applicant has argued that the cited prior art fails to teach the feature of the discharge confining means being located "for maintaining uniform reaction in the vacuum processing chamber; however, as stated above, Lenz et al.'751 discloses that location of the discharge confining means 30 maintains the plasma discharge region over the wafer to enhance uniform reaction. Thus, the rejection of Lenz et al.'751 in view of Ohmi'417 and Lenz et al.'356 satisfies the claimed requirement.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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